



United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Arizona

Basin Outlook Report

March 1, 2004



Basin Outlook Reports and Federal - State - Private Cooperative Snow Surveys

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How forecasts are made

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snow courses and automated SNOTEL sites, along with precipitation and streamflow values are used in computerized statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

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Issued by

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ARIZONA

Water Supply Outlook Report as of March 1, 2004

A full range of Snow Survey and Water Supply Forecasting products is available on the Arizona NRCS Home Page

Arizona Snow Survey Program

<http://www.az.nrcs.usda.gov/snow/index.html>

Helpful Internet Sites

Defending Against Drought – NRCS

<http://www.nrcs.usda.gov/feature/highlights/drought.html>

- Ideas on water, land, and crop management for you to consider while creating your drought plan.

Arizona Agri-Weekly

<http://www.nass.usda.gov/az/cur-agwk.pdf>

- Provides an overview of Arizona's crop, livestock, range and pasture conditions as reported by local staffs of the USDA's Agricultural Statistic Service and the University of Arizona, College of Agriculture.

SUMMARY

Snow surveys conducted at the end of February show snowpack levels are well below average for this time of year. As a result, the long range forecast calls for well below normal streamflow levels during the late winter and early spring runoff season.

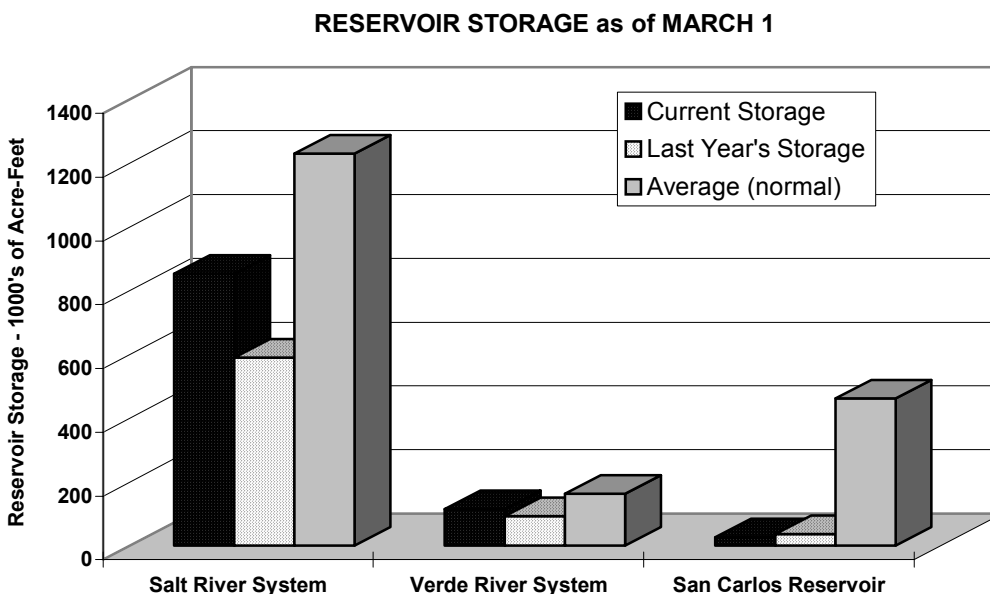
SNOWPACK

Watershed	Percent (%) of 30-Yr. Average Snowpack Levels as of March 1
Salt River Basin	73%
Verde River Basin	76%
Little Colorado River Basin	62%
San Francisco-Upper Gila River Basin	65%
Other Points of Interest	
Chuska Mountains	83%
Central Mogollon Rim	68%
Grand Canyon	70%
San Francisco Peaks	81%
Statewide Snowpack	73%

PRECIPITATION

February data shows much above average precipitation catch at key stations in northwestern Arizona, however, the Oct-February seasonal cumulative catch remains well below normal for the region. Additionally, NRCS SNOTEL stations in the Verde basin recorded abundant moisture for the month of February. For more information on precipitation levels, please refer to the basin bar graphs found in this report.

RESERVOIR



Key storage volumes displayed in thousands of acre-feet (1000 x):

RESERVOIR	CURRENT STORAGE	LAST YEAR STORAGE	30-YEAR AVERAGE
-----	-----	-----	-----
Lyman Lake	2.3	2.3	15.4
Show Low Lake	2.1	2.1	3.7
Lake Pleasant	659.7	582.7	----
Lake Havasu	572.9	572.9	552.4
Lake Mohave	1728.5	1728.5	1675.1
Lake Mead	16978.0	16978.0	22122.0
Lake Powell	12844.0	12844.0	18236.0
Salt River System	590.1	590.1	1231.5
Verde River System	115.7	92.6	163.5
San Carlos Reservoir	27.2	37.6	461.4

STREAMFLOW

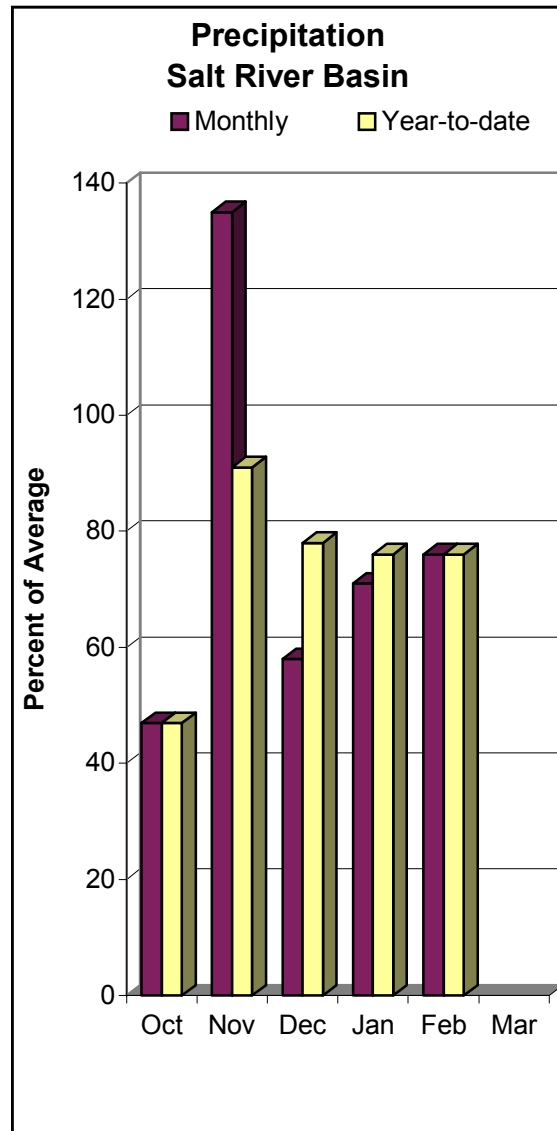
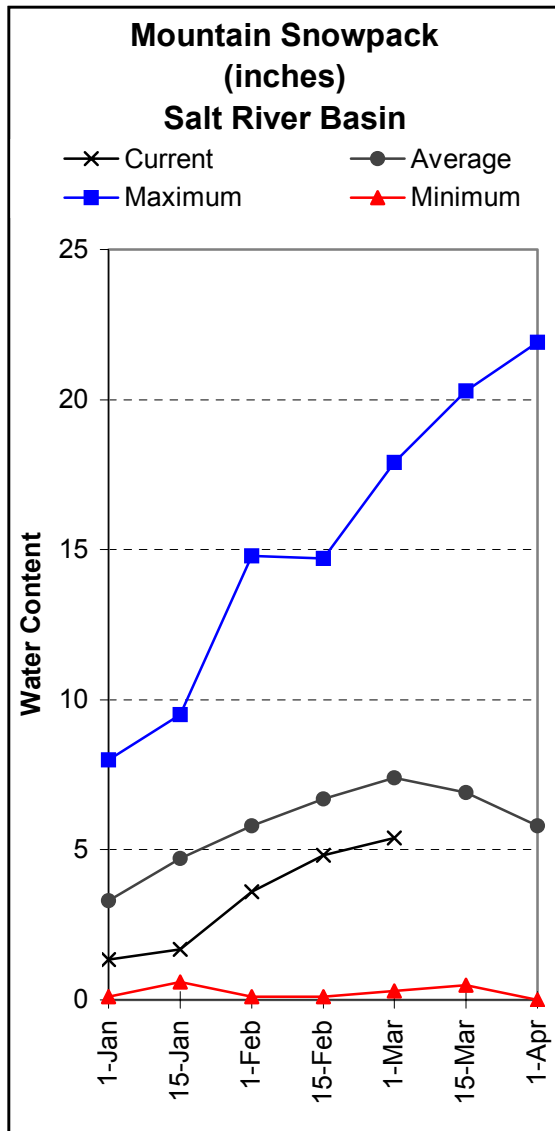
Below median streamflow levels are forecast for key watersheds in Arizona. Please refer to the forecast tables found in this report for more information regarding seasonal runoff forecasts.



SALT RIVER BASIN as of March 1, 2004

Below median streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 39 % of median streamflow levels through MAY, while at Tonto Creek, the forecast calls for 23 % of median streamflow levels through MAY.

Snow survey measurements show the Salt snowpack to be 73 % of the 30-year average, while combined reservoir storage for the Salt River system stands at 853,763 acre-feet.



SALT RIVER BASIN
Streamflow Forecasts - March 1, 2004

<=== Drier === Future Conditions === Wetter ===>							
Forecast Pt	Chance of Exceeding *						
Forecast	90%	70%	50% (Most Prob)	30%	10%	30 Yr Med	
Period	(1000AF)	(1000AF)	(1000AF) (% MED.)	(1000AF)	(1000AF)	(1000AF)	
Salt River nr Roosevelt							
MAR-MAY	39	73	105	39	145	219	270
MARCH	6.0	20	40	31	77	131	131
Tonto Creek ab Gun Creek nr Roosevelt							
MAR-MAY	0.2	2.3	6.0				
23	12.2	28	26				
MARCH	0.5	1.7	3.0	18	10.2	21	16.9

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.

SALT RIVER BASIN
Reservoir Storage (1000AF) End of February

Reservoir	Usable Capacity	***** This Year	Usable Storage Last Year	***** Average
SALT RIVER RES SYSTEM	2025.8	853.8	590.1	1231.5

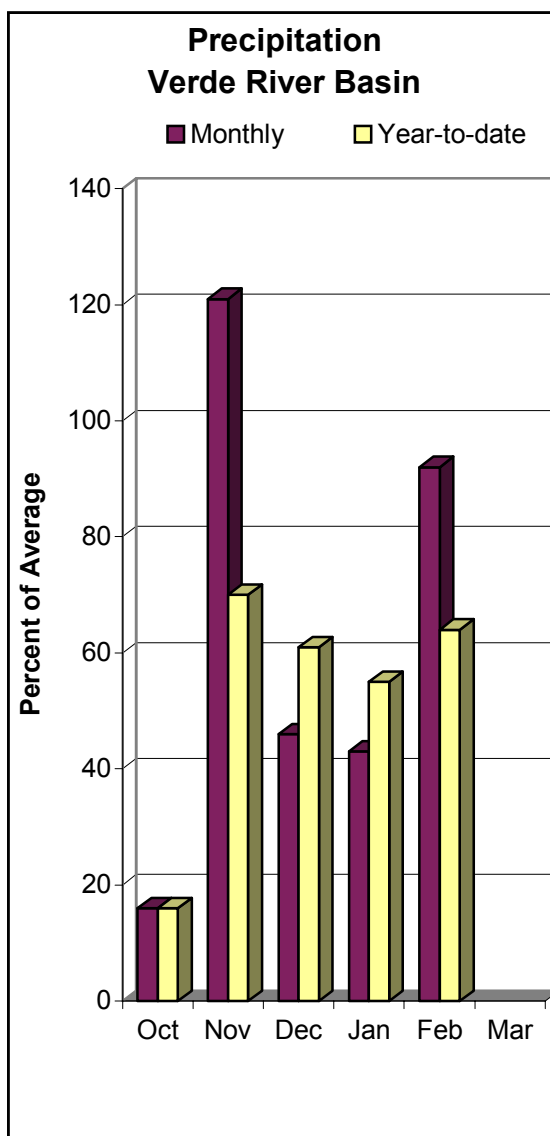
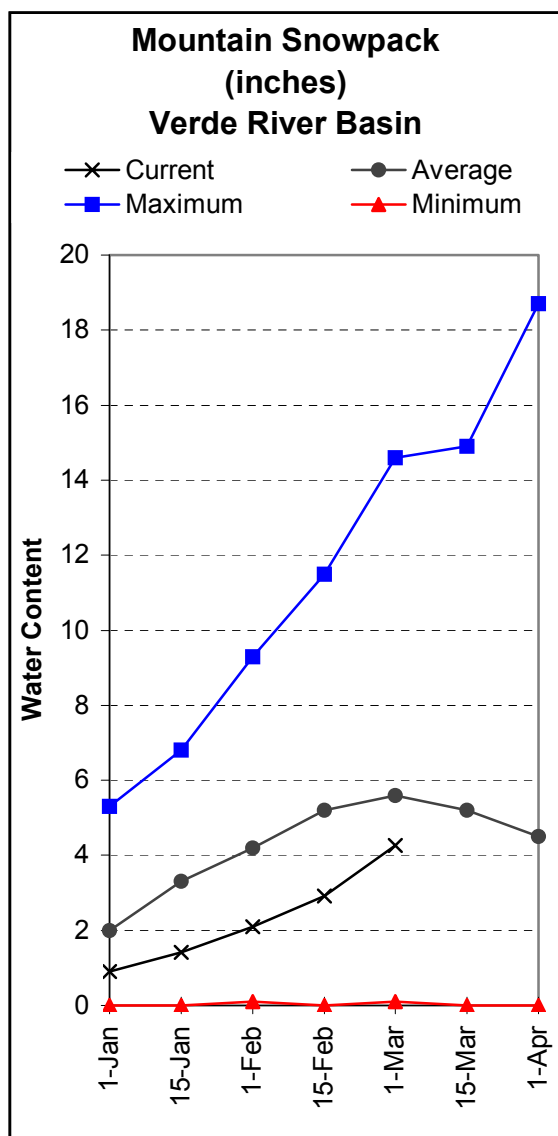
SALT RIVER BASIN
Watershed Snowpack Analysis - March 1, 2004

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
SALT RIVER BASIN	8	89	73

VERDE RIVER BASIN as of March 1, 2004

Below median streamflow levels are forecast for the basin. In the Verde River, at Horseshoe Dam, the forecast calls for 45 % of median streamflow levels through MAY.

Snow survey measurements show the Verde snowpack to be 76 % of the 30-year average, while combined reservoir storage for the Verde River system stands at 115,691 acre-feet.



VERDE RIVER BASIN
Streamflow Forecasts - March 1, 2004

	<=== Drier === Future Conditions === Wetter ===>					
Forecast Pt	===== Chance of Exceeding * =====					
Forecast	90%	70%	50% (Most Prob)	30%	10%	30 Yr Med
Period	(1000AF)	(1000AF)	(1000AF) (% MED.)	(1000AF)	(1000AF)	(1000AF)
Verde River abv Horseshoe Dam						
MAR-MAY	19.0	42	65	45	95	154
MARCH	5.0	17.5	35	70	72	127

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.

VERDE RIVER BASIN
Reservoir Storage (1000AF) End of February

Reservoir	Usable Capacity	***** This Year	***** Usable Storage Last Year	***** Average
VERDE RIVER RES SYSTEM	287.4	115.7	92.6	163.5

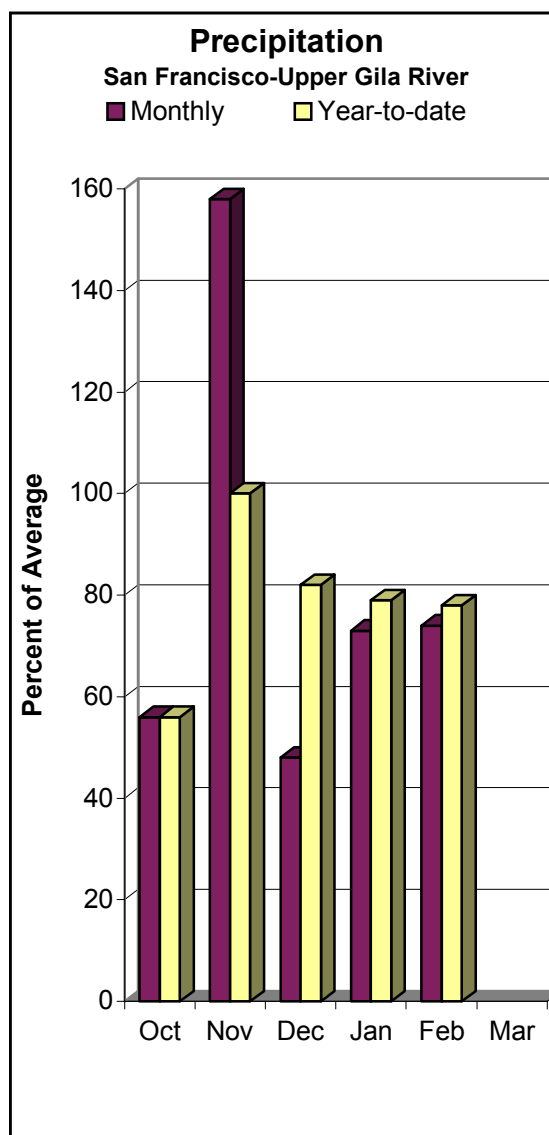
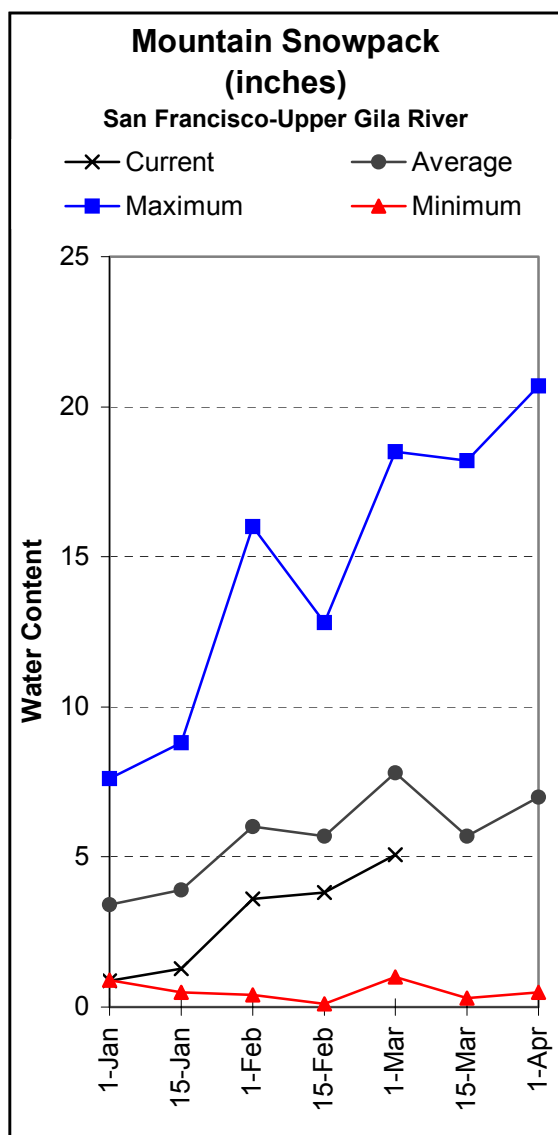
VERDE RIVER BASIN
Watershed Snowpack Analysis - March 1, 2004

Watershed	Number of Data Sites	This Year as Percent of Last Year	Percent of Average
VERDE RIVER BASIN	10	141	76
SAN FRANCISCO PEAKS	4	88	81

SAN FRANCISCO - UPPER GILA RIVER BASIN as of March 1, 2004

Below median streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 37 % of median streamflow levels through MAY, while in the Gila River, near Solomon, the forecast calls for 24 % of median streamflow levels through MAY. At San Carlos Reservoir, inflow into the lake is forecast at 16 % of median through MAY.

At San Carlos, reservoir storage stands at 27,180 acre-feet, while snow survey measurements show snowpack levels to be 65 % of the 30-year average.



SAN FRANCISCO - UPPER GILA RIVER BASIN
Streamflow Forecasts - March 1, 2004

	<=== Drier === Future Conditions === Wetter ===>						
Forecast Pt	Chance of Exceeding *						
Forecast	90%	70%	50% (Most Prob)	30%	10%		30 Yr Med
Period	(1000AF)	(1000AF)	(1000AF) (% MED.)	(1000AF)	(1000AF)		(1000AF)
Gila River at Gila							
MAR-MAY	6.5	11.1	15.3	45	20	30	34
Gila River nr Virden							
MAR-MAY	2.8	7.5	14.5	31	28	48	47
San Francisco River at Glenwood							
MAR-MAY	1.6	4.0	6.5	40	9.9	16.8	16.4
San Francisco River at Clifton							
MAR-MAY	7.1	9.2	15.5	37	28	45	42
Gila River nr Solomon							
MAR-MAY	10.0	12.0	25	24	62	117	105
MARCH			13.0	25			53
San Carlos Reservoir inflow							
MAR-MAY	1.9	3.2	10.0	16	35	71	64

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1971-2000 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.

(2) - The value is natural volume - actual volume may be affected by upstream water management.

SAN FRANCISCO - UPPER GILA RIVER BASIN
Reservoir Storage (1000AF) End of February

Reservoir	Usable Capacity	***** This Year	Usable Storage Last Year	***** Average
SAN CARLOS	875.0	27.2	37.6	461.4
PAINTED ROCK DAM	2492.0	0.0	0.0	288.1

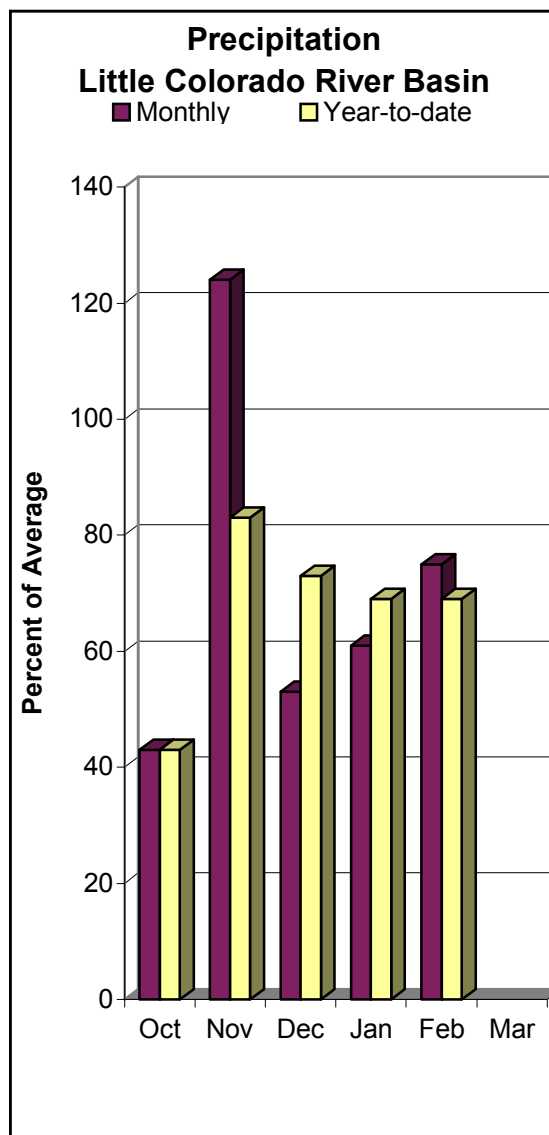
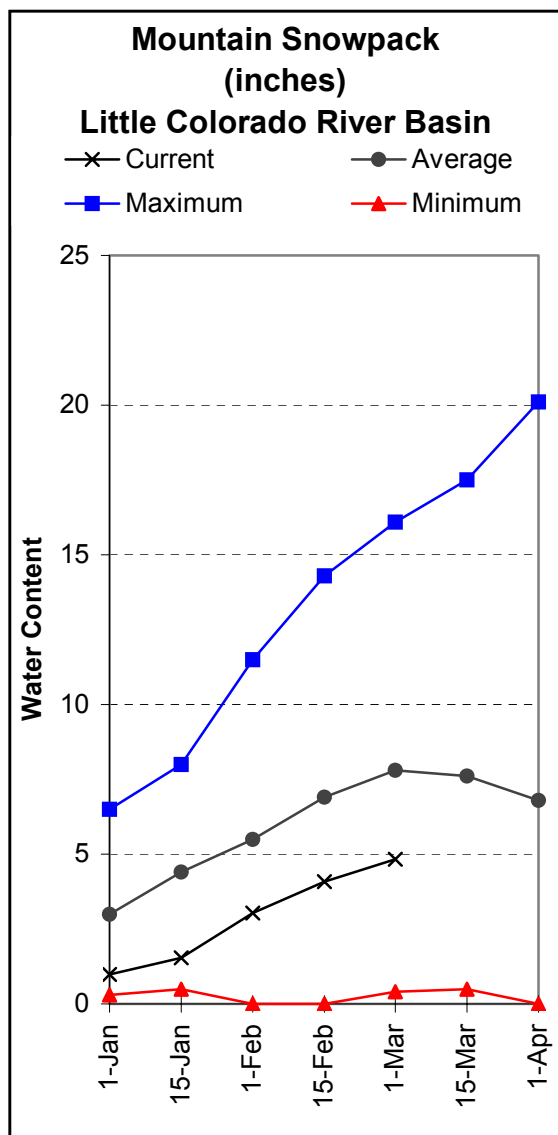
SAN FRANCISCO - UPPER GILA RIVER BASIN
Watershed Snowpack Analysis - March 1, 2004

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
SAN FRANCISCO - UPPER GILA R	11	76	65

LITTLE COLORADO RIVER BASIN as of March 1, 2004

Below median streamflow levels are forecast for the basin. In the Little Colorado River, at Lyman Lake, the forecast calls for 35 % of median streamflow levels through JUNE, while at Woodruff, the forecast calls for 35 % of median streamflow levels through MAY.

Snowpack levels along the southern headwaters of the Little Colorado River, and along the Central Mogollon Rim, were measured at 62 % and 68 % of the 30-year average, respectively.



LITTLE COLORADO RIVER BASIN
Streamflow Forecasts - March 1, 2004

	<=== Drier === Future Conditions === Wetter ===>						
Forecast Pt	Chance of Exceeding *						
Forecast	90%	70%	50% (Most Prob)	30%	10%		30 Yr Med
Period	(1000AF)	(1000AF)	(1000AF) (% MED.)	(1000AF)	(1000AF)		(1000AF)
Little Colorado River abv Lyman Lake							
MAR-JUN	0.42	1.25	2.20	35	3.53	6.33	6.30
Rio Nutria nr Ramah							
MAR-MAY	0.19	0.44	1.10	41	1.89	2.70	2.70
Ramah Reservoir inflow							
MAR-MAY	0.04	0.15	0.60	40	1.12	1.79	1.49
Zuni River abv Black Rock Reservoir							
MAR-MAY	0.12	0.28	0.43	48	0.63	1.03	0.89
Little Colorado River at Woodruff							
MAR-MAY	0.11	0.33	0.77	35	1.32	1.98	2.20
Blue Ridge Reservoir inflow							
MAR-MAY	1.6	3.5	5.2	41	7.2	10.9	12.8
Lake Mary inflow							
MAR-MAY	0.35	0.91	1.52	37	2.35	4.06	4.10

- * 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.
The average and median are computed for the 1971-2000 base period.
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LITTLE COLORADO RIVER BASIN
Reservoir Storage (1000AF) End of February

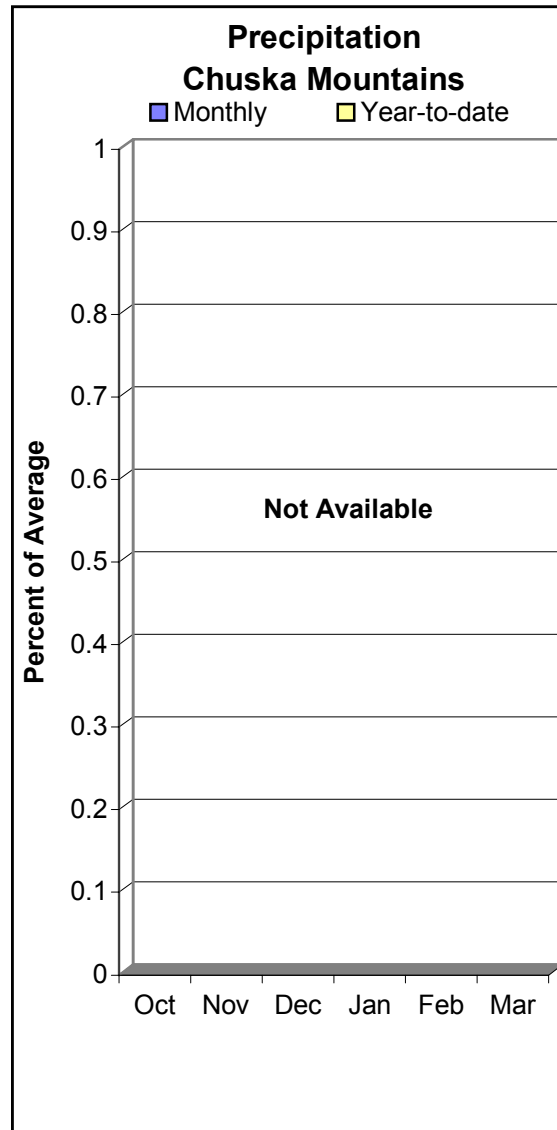
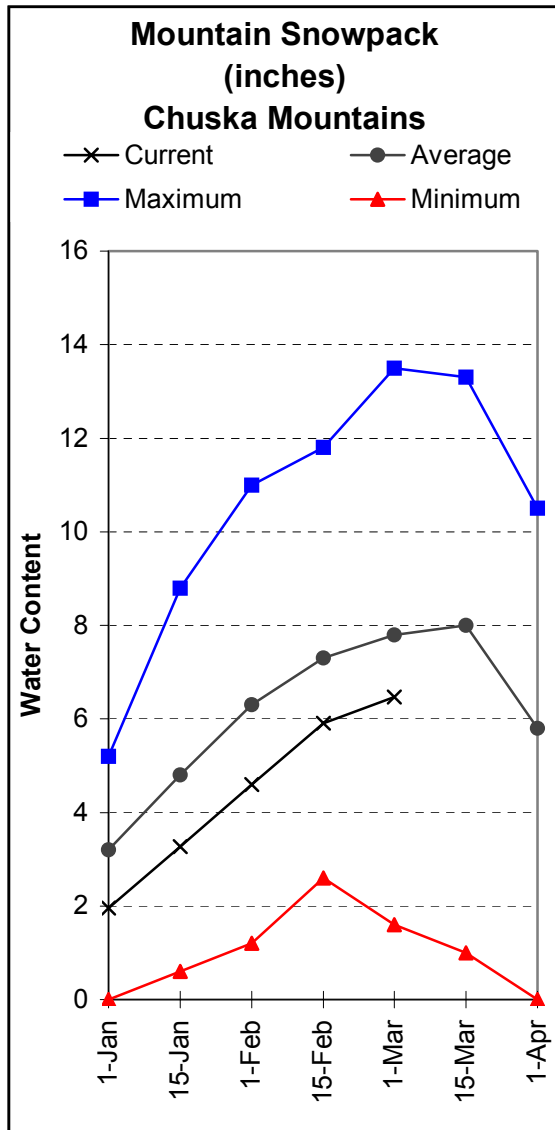
Reservoir	Usable Capacity	***** This Year	***** Usable Storage Last Year	***** Average
LYMAN RESERVOIR	30.0	2.2	2.3	15.4
SHOW LOW LAKE	5.1	3.2	2.1	3.7

LITTLE COLORADO RIVER BASIN
Watershed Snowpack Analysis - March 1, 2004

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
LITTLE COLORADO - SOUTHERN H	9	80	62
CENTRAL MOGOLLON RIM	4	93	68

CHUSKA MOUNTAINS as of March 1, 2004

Snow survey measurements conducted by staff of the Navajo Tribe show the Chuska snowpack to be 83 % of average, while below average streamflow levels are forecast for Captain Tom Wash, Wheatfields Creek, and Bowl Canyon Creek this season.



CHUSKA MOUNTAINS
Streamflow Forecasts - March 1, 2004

	<=== Drier === Future Conditions === Wetter ===>						
Forecast Pt	Chance of Exceeding *						
Forecast	90%	70%	50% (Most Prob)	30%	10%		30 Yr Avg
Period	(1000AF)	(1000AF)	(1000AF) (% AVG.)	(1000AF)	(1000AF)		(1000AF)
Captain Tom Wash nr Two Gray Hills							
MAR-MAY	0.42	0.85	1.70	60	3.30	5.80	2.83
Wheatfields Creek nr Wheatfields							
MAR-MAY	0.44	0.87	1.75	60	3.45	5.95	2.90
Bowl Canyon Creek abv Assayi Lake							
MAR-MAY	0.15	0.30	0.60	60	1.18	2.09	1.00

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

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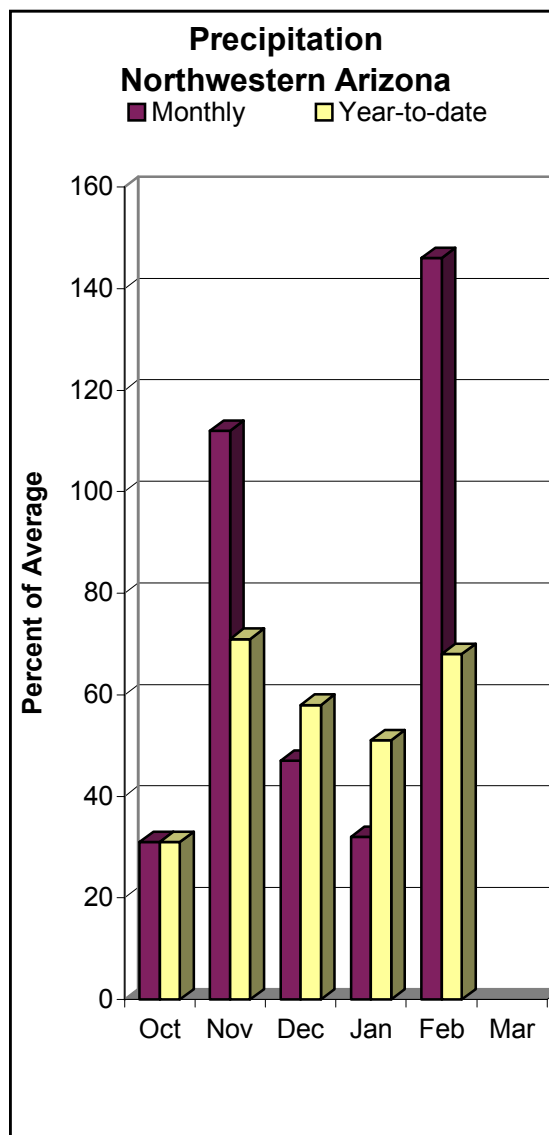
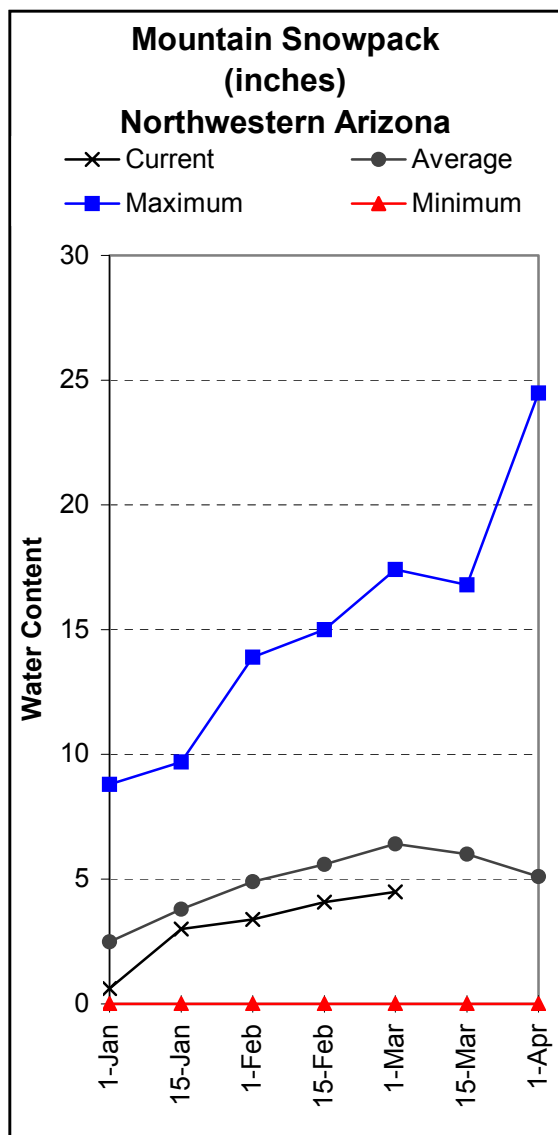
CHUSKA MOUNTAINS
Watershed Snowpack Analysis - March 1, 2004

Watershed	Number of Data Sites	This Year as Percent of Last Year	Percent of Average
CHUSKA MOUNTAINS	7	106	83
DEFIANCE PLATEAU	2	179	89

NORTHWESTERN ARIZONA as of March 1, 2004

On the Colorado River, inflow into Lake Powell is forecast at 82 % of average for the period APRIL-JULY, while at Littlefield, the Virgin River is forecast at 62 % of average for the period APRIL-JULY.

At the Grand Canyon, snow survey measurements conducted by the National Park Service show the snowpack to be at 70 % of the 30-year average.



NORTHWESTERN ARIZONA
Streamflow Forecasts - March 1, 2004

	<=== Drier === Future Conditions === Wetter ===>						
Forecast Pt	Chance of Exceeding *						
Forecast	90%	70%	50% (Most Prob)	30%	10%		30 Yr Avg
Period	(1000AF)	(1000AF)	(1000AF) (% AVG.)	(1000AF)	(1000AF)		(1000AF)
Virgin River at Littlefield							
APR-JUL	18.0	35	46	62	57	74	74
Lake Powell inflow							
APR-JUL	3600	5330	6500	82	7670	9400	7930

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

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- (2) - The value is natural volume - actual volume may be affected by upstream water management.

NORTHWESTERN ARIZONA
Reservoir Storage (1000AF) End of February

Reservoir	Usable Capacity	***** This Year	***** Usable Storage Last Year	***** Average
LAKE HAVASU	619.0	556.5	572.9	552.4
LAKE MOHAVE	1810.0	1715.6	1728.5	1675.1
LAKE MEAD	26159.0	15404.0	16978.0	22122.0
LAKE POWELL	24322.0	10569.0	12844.0	18236.0

NORTHWESTERN ARIZONA
Watershed Snowpack Analysis - March 1, 2004

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
GRAND CANYON	2	141	70

S N O W S U R V E Y D A T A

MARCH 1, 2004

SNOW COURSE	ELEV.	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 71-00
ARBABS FOREST (AK)	7680	2/26	6	1.8	1.0	2.1
BAKER BUTTE SNOTEL	7330	3/01	-	4.9	5.1	5.9
BAKER BUTTE #2	7700	2/26	24	6.6	6.3	12.3
BALDY SNOTEL	9220	3/01	-	5.8	8.0	8.0
BEAR PAW	10100	2/27	43	12.7	18.4	18.3
BEAVER HEAD	8000	2/28	12	2.9	2.7	2.9
BEAVER HEAD SNOTEL	7990	3/01	-	3.7	4.5	3.0
BEAVER SPRING	9220	2/26	28	6.9	5.5	9.7
BRIGHT ANGEL	8400	2/26	30	7.5	5.8	10.9
BUCK SPRING	7400	2/26	3	0.8	2.4	3.8
CHALENDER	7100	2/26	2	0.5	1.3	3.3
CHEESE SPRINGS	8600	2/26	15	3.6	4.8	5.9
CORONADO TRL SNOTEL	8400	3/01	-	2.8	1.7	3.3
CORONADO TRAIL	8350	2/28	7	1.2	2.2	3.0
FLUTED ROCK	7800	2/26	14	3.2	1.8	3.5
FORT APACHE	9160	2/26	19	4.6	7.4	7.9
FORT VALLEY	7350	2/25	3	0.6	0.4	2.6
FRY SNOTEL	7220	3/01	-	7.1	2.9	6.8
GRAND CANYON	7500	2/29	11	1.8	0.8	2.4
HANNAGAN MDWS SNOTEL	9020	3/01	-	9.3	9.0	11.7
HAPPY JACK	7630	2/28	15	3.3	2.7	4.8
HAPPY JACK SNOTEL	7630	3/01	-	5.9	4.3	6.1
HEBER SNOTEL	7640	3/01	-	3.3	4.0	5.0
LAKE MARY	6930	2/26	2	0.8	0.8	3.3
MAVERICK FORK SNOTEL	9200	3/01	-	6.5	7.0	10.2
MORMON MTN SNOTEL	7500	3/01	-	6.9	3.1	6.7
MORMON MT. SUMMIT #2	8470	2/26	26	7.9	8.7	13.5
NEWMAN PARK	6750	2/25	8	2.7	1.1	2.5
NUTRIOSO	8500	2/28	6	1.1	1.5	1.8
PROMONTORY SNOTEL	7900	3/01	-	9.9	11.3	12.9
SNOW BOWL #1 ALT.	10260	3/01	41	10.0	5.6	12.3
SNOW BOWL #2	11000	3/01	48	11.4	16.6	17.2
SNOWSLIDE CANYON	9750	2/27	36	9.0	13.0	14.0
SNOWSLIDE CYN SNOTEL	9750	3/01	-	14.6	14.8	12.4
TSAILE CANYON #1	8160	2/25	24	5.6	4.7	6.1
TSAILE CANYON #3	8920	2/25	33	8.0	7.7	8.7
WHITE HORSE SNOTEL	7180	3/01	-	3.3	2.7	5.3
WILDCAT SNOTEL	7850	3/01	-	3.3	2.5	4.4
WILLIAMS SKI RUN	7720	2/26	23	7.0	3.7	8.9
WORKMAN CREEK SNOTEL	6900	3/01	-	5.1	6.1	5.3